

Measuring Reader Comprehension Of a Preschool Pamphlet

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A RECENT ADDITION to the health education material of the Minnesota Department of Health is a brief, easy-to-read brochure titled "Getting Your Child Ready for School" (1). There is nothing novel in the concept of a pamphlet for parents with preschool children that carries the same kind of health message as does a personal visit from health workers to parents. What singles out this pamphlet for special attention are the pretesting techniques applied in the evaluation of the material before its publication.

Greenberg and associates (2) point out that no matter how satisfactorily a piece of literature might appear to fulfill its intended goals, there still remains the need for adequate testing. Preferably, this testing should be done in advance of publication, for, as Knutson (3)

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states, by pretesting our materials while they are in rough form, we can find out whether they make good sense to the intended reader whose experiences may differ from our own. Such tests are a means of obtaining the other man's perception or interpretation of the message so that changes can be made to take into account his pattern of understanding and his way of life.

Carefully prepared material in the health pamphlet was tested by the Minnesota Department of Health on a homogeneous group of mothers. We wished to learn to what extent mothers could acquire and retain information from the text. To do this, we needed to measure the difference in knowledge between a group of mothers who had received the preliminary material and a comparable group who had not received it. The technique was an adaptation of a testing method described by Ford and Stief in the preparation of a pamphlet on the nutritional importance of milk (4).

The various steps in pretesting to be described in this report are not to be considered a substitute for program evaluation. Knowledge, as reflected in the ability to give a correct answer, is a necessary first step in effective health education, but the best criteria for determining success are desirable changes in behavior among those to whom the program is directed.

The Editorial Approach

Health as it relates to the individual child, rather than health for health's sake, was the

theme of the pamphlet, "Getting Your Child Ready for School."

One section stressed the contribution of parents and others in the emotional growth and development of the child. Specific reasons why the child should have physical and dental examination were presented in another. Another section was devoted to immunization, and another to the need for sound health practices and habits. Special emphasis was given to the need for training in safe behavior to reduce accident morbidity and mortality among children, because accidents are the leading cause of death among Minnesota children. Statistics had also indicated the need for emphasis on nutrition education and sound dietary practices. An effort was made to show how home and school work together for the protection of every child.

Stressing these topics, it was believed, would reinforce the direct health teaching of physicians and other health workers.

Testing for Readability

The pamphlet was intended for broad, general distribution among young mothers with small children about to start school. Since the material should be easy to read and as interesting as possible, an informal style was adopted. Emphasis was placed on short sentences and 1-syllable words directed to the individual mother and her child.

After the material had been written, a simplification of the Flesch reading ease formula (5) was applied to it as a yardstick for readability. The reading ease score was determined by the relationship between the number of 1-syllable words to the average sentence length in 100-word samples. The human interest score represented the ratio between personal words and personal sentences in 100-word samples. The same 100-word samples were used for both scores.

The formula was applied to the first 100 words on the first page of the typewritten manuscript, to the second 100 words on the second page, and to the last 100 words on the third page. This order was repeated for the remaining pages, to give a 900-word sample from approximately 1,800 words. The scores for the combined sample were averaged.

The material scored 75 on the Flesch scale for reading ease. A score of 70 to 80 is rated "fairly easy reading." It is comparable to the sixth grade educational level. Although 85 percent of Minnesota's adult population have had at least 6 years of schooling according to the 1950 census reports (6), it is not certain whether their educational level reflects their reading ability. However, indication that this level was attained was valuable for testing purposes, since the material was to be understandable to most mothers.

On the human interest scale, the material was rated a score of 60. A score of 40 to 60 is considered "highly interesting." Since the scores for word samples were within the ranges of "fairly easy reading" and "highly interesting," there was no need to revise individual portions of the basic material to increase reading ease or human interest. The average sentence length was 13 words, with an average of 75 1-syllable words in each 100-word sample. The average percentage of personal words was 12. The average percentage of personal sentences was 50.

Preparation of the Questionnaire

A questionnaire based on the material in the pamphlet was constructed to find out whether people would understand and correctly interpret the information. The questionnaire would be given to two groups of women, one composed of those who had seen the material and the other of those who had not. Differences in scores between the two groups could provide valuable clues as to the usefulness of the material to potential readers.

Ten multiple-choice questions were constructed to cover the basic subject matter in the draft of the pamphlet. The questions were arranged in the order in which the topics appeared. Each question had 4 alternative answers. Correctness was based on positive statements made in the text. The order of the alternative choices was determined by chance, according to a table of random numbers. The questionnaire also contained five additional questions on education, family size, and other data for statistical analysis. Respondents did not sign their names.

The questionnaire was tested on 2 pilot groups of 50 women each who had not seen the material. Analysis of replies led to a revision of the questionnaire for greater clarification. This revised form was then tested on 2 other pilot groups of 10 who had seen the draft pamphlet and 10 who had not. The former scored higher than the latter, and the differences in the scores were statistically significant in the expected direction.

This exploratory research served a dual purpose:

In the first place, it made it possible to test the effectiveness of the instrument which would be used to measure the information impact of the pamphlet material.

And secondly, responses to the questionnaire pointed up areas where additional editorial emphasis was needed in the pamphlet. The answers were useful in much the same way that the direct interview approach reveals basic attitudes and prejudices.

For example, so many people believe that a child should never be allowed to eat between meals that we developed a brief section on good snack foods for hungry boys and girls. It began with the sentence:

"It's all right for him to have a snack when he comes home from school or before he goes to bed."

Many people had also answered the question from which this statement was developed by saying that a child should always be made to clean up his plate. That alternative answer led to this positive statement in the section of the pamphlet on good food habits and how they grow:

"When you force, urge, or coax him to clean up his plate, he becomes the center of attention. He likes it! What began as a whim may become a fixed habit."

The number of correct responses to questions such as the one on the diseases against which children should be immunized was a tribute to the educational activities of many persons and many agencies over a period of many years. But the fact that incorrect choices were made indicated the need for continued educational effort. Negative answers were also a justifica-

tion for including information on simple health habits, information which one might assume to be common knowledge.

Selection of the Sample

For the study, we sought a group of mothers whose children would soon begin their schooling. We desired such a group in order to eliminate as much as possible the factor of previous exposure to the ideas in the pamphlet. Likewise, we preferred mothers who were the least likely to have attended well-child clinics or preschool roundups, or to have had the advice of pediatricians. Working mothers with young children in day-care centers seemed the most likely to have these qualifications.

After consultation with the Minnesota State Department of Public Welfare, 4 nurseries, similar in size of enrollment and other factors, were selected from among the 28 facilities of this kind in Minneapolis. Each center was located in a neighborhood of families living on relatively low earnings. The mothers were mostly factory or clerical workers.

Copies of the mimeographed text of the pamphlet were taken by health department workers to each center on a Friday afternoon at the time when parents called for their children. Every second parent was asked to take the material home. The child's mother was requested to read it over the weekend, but she was not told that the mothers would be tested at a later date. On Monday afternoon at the same time, the questionnaire was given to every adult who came for a child. Questionnaires completed by men, neighbors, or older children were excluded from the subsequent tabulations. These exclusions resulted in experimental and control groups that were not numerically equal in size, but since results were computed in percentages, this difference was considered not important.

All of the women who had been given an opportunity to read the material claimed to have done so, but it was logical to assume that some had read the text more carefully than others. For the purposes of this study, however, they all were classified as "readers." Mothers who had not received the mimeographed material were classified as "nonreaders." A disadvantage in this method is that where the sample

Cumulative percentages of scores of readers and nonreaders in combined sample of 35

Score	Readers			Nonreaders		
	Frequency	Cumulative frequency	Cumulative percentage	Frequency	Cumulative frequency	Cumulative percentage
100.....	4	4	19			
90 or more.....	4	8	38			
80 or more.....	7	15	71	6	6	43
70 or more.....	5	20	95	2	8	57
60 or more.....	0	20	95	3	11	79
50 or more.....	1	21	100	1	12	86
40 or more.....				0	12	86
30 or more.....				1	13	93
20 or more.....				1	14	100
Total.....	21	21	100	14	14	100

is small, a few who claim to have read the material but do so casually or not at all may so dilute the sample that the validity of the results are questionable.

The testing results for each nursery were tabulated to determine whether the experimental and control groups were similar in age, family size, and education, and to discover whether differences in knowledge existed between readers and nonreaders. When it was found that the differences in the characteristics of the experimental and control groups at each of the four centers were not statistically significant, the samples were combined for each group.

Description of the Sample

The combined sample of 21 readers and 14 nonreaders from the 4 nurseries was small, but it had been drawn according to the recognized principles of good sampling. All respondents in the combined sample were working mothers between the ages of 20 to 29. Only two had attended a preschool roundup. The educational level of the group in the sample was comparable to that of the State as a whole, or about 12 years for women in the same age group (6). The educational level of the nonreaders was similar to that of the readers. Most of the children were under 5, and two-thirds of the mothers had only 1 child. Since the differences in the variables of age, education, and number and ages of children were not statistically significant, we concluded that the experimental and control groups were similar and representa-

tive of the elements considered significant for the purposes of the study.

Readers vs. Nonreaders

The cumulative percentages of scores for readers and nonreaders are shown in the table.

With 100 representing a perfect score, the mean score for readers was 82, and the standard deviation was 12.6. The mean score of nonreaders was 64, with a standard deviation of 18.8. The critical ratio was 3.7. A ratio of this size means that it is improbable such a difference would occur by chance. In other words, readers on the average correctly answered approximately 8 questions, and nonreaders approximately 6 of the 10 questions. The difference was statistically significant in the expected direction.

Nonreaders were consistently below readers in performance level at all scores. No nonreader scored higher than 80, but 38 percent of the readers did. Only 57 percent of the nonreaders scored 70 or higher, in contrast to the 95 percent of the readers who did so; 71 percent of the readers made a score that was equal to or better than the top score for nonreaders. Only 5 percent of the readers scored below 70, but 43 percent of the nonreaders did so.

Findings relative to scores were significant only in terms of responses to all 10 questions. That is, differences in the number of correct responses to individual questions for readers and nonreaders were not statistically significant at the level selected to measure the reliability

of differences. None of the 10 questions in the questionnaire served to discriminate between readers and nonreaders, but 2 of the questions used came close to this level.

In response to the multiple-choice question, "To encourage good food habits in a child, parents should (a) make him clean up his plate before he can leave the table; (b) coax him to eat the foods they want him to eat; (c) keep him from eating between meals; (d) eat the same foods they want him to eat," 62 percent of the group of readers and 21 percent of the group of nonreaders answered correctly. The critical ratio was 2.4. (Item *d* was the correct choice.)

In response to the question, "In the winter children should wear warm outer clothing that covers their entire body because: (a) they need their energy for growth; (b) without such clothing they won't be allowed to go outdoors for recess; (c) they will catch cold otherwise; (d) they can't play in the snow," 52 percent of the group of readers and 7 percent of the group of nonreaders answered correctly. The critical ratio was 2.8. (In this instance, item *a* was correct in terms of a definite statement made in the pamphlet.)

However, when the responses of readers and nonreaders to these two questions were combined, the results were statistically significant. In combination, the mean percent of correct answers among nonreaders was 14, and among readers, 57 percent. Apparently these two questions in combination were discriminatory ones. More than any of the other questions, they distinguished between readers and nonreaders.

Each one of the group of readers was asked to rate the material as dull, mildly interesting, interesting, or highly interesting. Fifty-seven percent found it highly interesting; 43 percent found it interesting; no one rated it dull or mildly interesting.

Evaluation of the Pamphlet

These pretesting techniques contributed materially to increased pamphlet effectiveness. The fact that a small sample may produce significant results is an additional recommendation for the use of the pretesting method.

Statistical analysis of data provided evidence that readers of the material were better informed on the subject matter than nonreaders. The experimental and control groups were homogeneous, so differences could only be explained on the basis of the impact of the text. The findings indicated that the text would be of value to the special audience for which it was designed.

There was evidence that readers with an educational level of about 12 years found interest in information that was written at the sixth grade level, suggesting that there is not necessarily a loss of readership when material for general distribution is written for a level that is considerably below that of a portion of the intended audience, provided that the material is related to their interests and problems.

Research of this kind has proved its worth in the production of health education materials. Such methods make it possible to test material at a point where changes can still be made. They are ones that anyone with a limited knowledge of statistical techniques can apply with a minimum expenditure of time and effort, and in terms of more effective public health literature, it is well worth the investment of both.

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